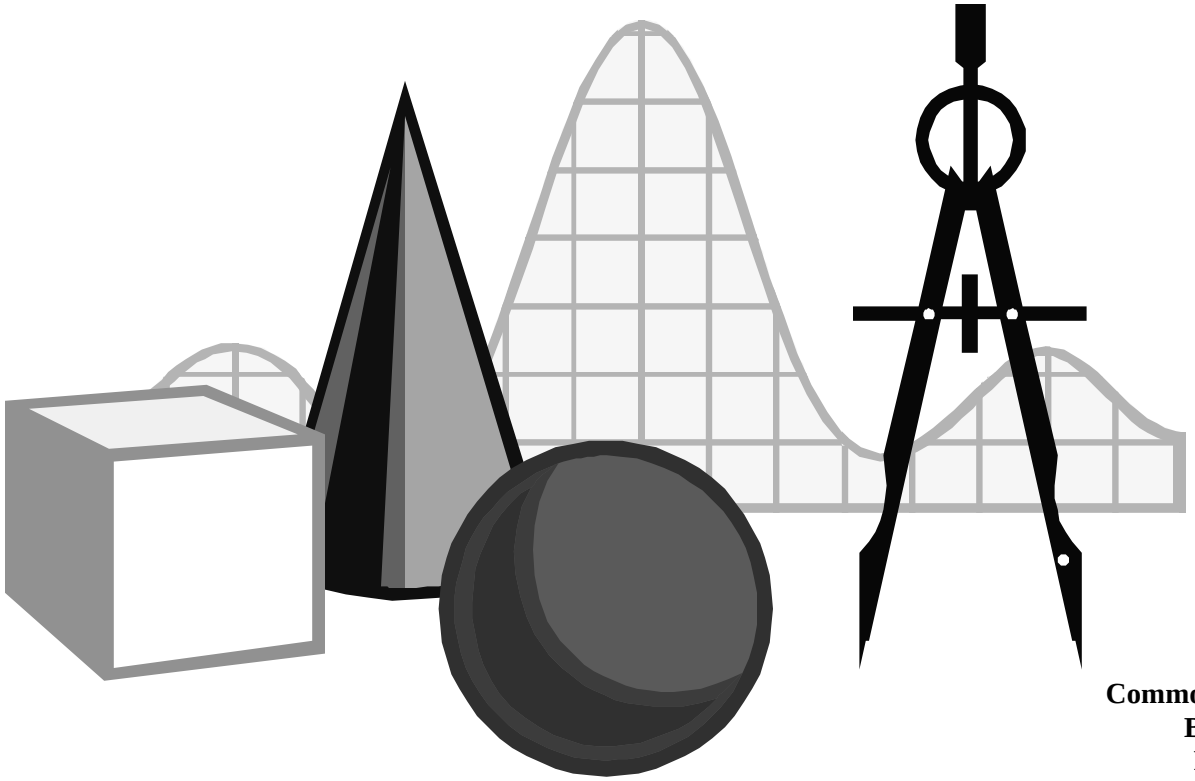
MATHEMATICS STANDARDS OF LEARNING SAMPLE SCOPE AND SEQUENCE

Grade 5



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Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

by the

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The *Mathematics Standards of Learning Sample Scope and Sequence* and the *Mathematics Standards of Learning Curriculum Framework* can be found in a PDF and Word file format on the Virginia Department of Education's Web site at http://www.pen.k12.va.us

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

Preface

As an additional resource to help school divisions develop curricula aligned to the 2001 Mathematics Standards of Learning, the Virginia Department of Education has developed sample scope and sequence documents in kindergarten through grade eight and in core high school courses. These sample documents provide guidance on how the essential knowledge and skills that are identified in the Standards of Learning and the Standards of Learning Curriculum Framework may be introduced to students in a logical, sequential, and meaningful manner.

These sample scope and sequence documents are intended to serve as general guides to help teachers and curriculum developers align their curricula and instruction to support the Standards of Learning. Each sample document is organized around specific topics to help teachers present information in an organized, articulated manner. Also included are correlations to the Standards of Learning for that curricular area for a particular grade level or course, as well as ideas for classroom assessments and teaching resources.

The sample scope and sequence documents are not intended to prescribe how curriculum should be developed or how instruction should be delivered. Instead, they provide examples showing how teachers and school divisions might present to students in a logical and effective manner information that has been aligned with the Standards of Learning. School divisions that need assistance in developing curricula aligned with the Standards of Learning are encouraged to consider the sample scope and sequence guides. Teachers who use the documents should correlate the content identified in the guides with available instructional resources and develop lesson plans to support instruction.

Copies of the sample scope and sequence guides are available at http://www.pen.k12.va.us in both PDF and Microsoft Word formats.

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

Introduction

The elementary school sample mathematics scope and sequence is based on the essential knowledge and skills identified in the Mathematics Standards of Learning Curriculum Framework. The sample scope and sequence is indexed by organizing topics reflective of the big ideas contained within the grade level curriculum and correlated to the Mathematics Standards of Learning. It is not intended to be a complete list of all the lessons that need to be taught and mastered during each elementary school grade, yet it sets forth a comprehensive set of instructional expectations that students should master to successfully achieve the grade level standards.

A primary purpose of this document is to offer teachers and curriculum developers one way to sequence and focus their curricula. Teachers may restructure the organizing topics into an instructional program that is inclusive, but better aligned with the available instructional resources (e.g., textbooks, supplemental resource materials, and technological support materials). Once the instructional materials for a scope and sequence are identified, teachers should give consideration to an alignment of the instructional time for each of the topics contained within an assessment reporting category or to the weight of the reporting category.

Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well. The resources section included in the sample scope and sequence document provides a list of manipulatives that may be used in the instructional lessons for the development of the concepts related to the content standards. It also includes page references to the Mathematics Curriculum Framework where instructional strategies and further information can be found for teaching the particular concepts and skills. Additionally, within the resource area, staff development resource documents produced by the Department of Education are listed and can be found on the Department of Education's Web site at www.pen.k12.va.us.

Assessments should support the learning of important mathematics and provide useful feedback to both teachers and students. The classroom assessment methods section in this sample scope and sequence lists a few types of the tests, tasks, and observations that should be used in assessing the student's progress. When teachers select assessment methods, they should ensure that all students have the opportunity to clearly and completely demonstrate what they know and are able to do. Whether the focus is on formative assessment aimed at guiding instruction, or on summative assessment of the student's knowledge, it is important that the teacher have a strong understanding of the mathematics being assessed and the skills to make valid inferences about a student's knowledge and understanding.

The content of the Mathematics Standards of Learning supports five goals for students: becoming mathematical problem solvers, communicating mathematically, reasoning mathematically, making mathematical connections, and representing mathematical ideas. These goals provide a framework for students to learn with understanding, actively building new knowledge from experience and prior knowledge. Therefore, throughout the study of mathematics, students should be encouraged to talk about mathematics, to use the language and symbols of mathematics, to discuss problems, to solve various types of problems in a variety of contexts, and to develop the competence and confidence in themselves as a mathematics student.

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

The Sample Mathematics Standards of Learning Scope and Sequence should serve as a resource tool for teachers and administrators for developing effective curricula, instruction, and classroom assessment. The degree of success that students have with the Mathematics Standards of Learning will depend upon the school division's implementation of an instructional program that is aligned with the Mathematics Standards of Learning.

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topics	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Whole Numbers: Representations & Relationships	K.1 K.2 K.3 K.4 K.5	1.1 1.2 1.3 1.4 1.5 1.7	2.1 2.2 2.3 2.5	3.1 3.2 3.3	4.1	
Whole Number Operations & Estimation: Addition and Subtraction	K.6	1.8 1.9	2.6 2.7 2.8 2.9 2.10 2.26	3.4 3.8	4.5 4.6	5.3
Whole Number Operations & Estimation: Multiplication and Division				3.4 3.9 3.10	4.7 4.8	5.3 5.5
Decimals: Representations & Relationships				3.7 3.12	4.2 4.4	5.1 5.2
Decimal Operations & Estimation: Addition and Subtraction				3.12	4.9	5.4
Decimal Operations & Estimation: Multiplication and Division						5.4 5.6
Fractions: Representations & Relationships		1.6	2.4	3.6 3.11 3.5	4.2 4.3	5.2
Fraction Operations & Estimation: Addition and Subtraction					4.9	5.7
Measurement Money	K.6 K.7	1.10	2.11	3.13		
Measurement: Length	K.8 K.10	1.12	2.12	3.14	4.11	5.11

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topics	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Measurement: Weight/Mass	K.8 K.10	1.12 1.14	2.15	3.14	4.10	5.11
Measurement: Volume (Liquid)		1.13	2.17	3.14	4.12	5.11
Measurement: Temperature	K.8 K.10		2.19	3.17		5.11
Measurement: Time	K.8 K.9	1.11	2.16 2.18	3.15 3.16		5.12
Measurement: Perimeter, Area, Volume, Circumference			2.12 2.7 2.13 2.14		4.13	5.8 5.9 5.10 5.11
Geometry: Two-Dimensional (plane)	K.11 K.12	1.16 1.17	2.22	3.18 3.19	4.14 4.15 4.16	5.13 5.14 5.15a
Geometry: Three-Dimensional (solid)			2.22 2.20	3.18	4.17a,b	5.16
Geometry: Transformations			2.21	3.20	4.17c	5.15b.c.d. e
Geometry: Spatial Relationships	K.13	1.15			4.18	
Statistics: Collect, Organize, Display, Analyze and Interpret Data	K.14 K.15	1.18 1.19	2.23	3.21 3.22	4.20	5.18 5.19
Probability	K.16		2.24	3.23	4.19	5.17
Patterns and Functions: Representations & Relationships	K.17 K.18	1.20 1.21	2.25	3.24	4.21	5.20
Algebra: Representations & Relationships			2.26	3.25	4.22	5.21 5.22

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Whole Number Operations & Estimation: Addition and Subtraction	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: calculators
	▪ Create problems involving the operations of addition, subtraction, multiplication, and/or division of whole numbers, using real-life situations. ▪ Estimate the sum, difference, product, and quotient of whole-number computations. ▪ Solve problems involving addition, subtraction, multiplication, and division of whole numbers, using paper and pencil, mental computation, and calculators, in which - sums, differences, and products will not exceed five digits; - multipliers will not exceed two digits; - divisors will not exceed two digits; or - dividends will not exceed four digits.	5.3		

Grade 5 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Whole Number Operations & Estimation: Multiplication and Division	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: calculators
	▪ Create problems involving the operations of addition, subtraction, multiplication, and/or division of whole numbers, using real-life situations. ▪ Estimate the sum, difference, product, and quotient of whole-number computations. ▪ Solve problems involving addition, subtraction, multiplication, and division of whole numbers, using paper and pencil, mental computation, and calculators, in which - sums, differences, and products will not exceed five digits; - multipliers will not exceed two digits; - divisors will not exceed two digits; or - dividends will not exceed four digits.	5.3		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Whole Number Operations & Estimation: Multiplication and Division (cont'd)	▪ Estimate the quotient of two whole numbers when given a dividend of four digits or fewer and a divisor of two digits or fewer. ▪ Determine the quotient with no remainder of two whole numbers when given a dividend of four digits or fewer and a divisor of two digits or fewer. ▪ Determine the quotient and remainder of two whole numbers when given a dividend of four digits or fewer and a divisor of two digits or fewer. ▪ Use estimation to check the reasonableness of a quotient.	5.5	▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: calculators

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimals: Representations & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: decimal squares, base 10 materials, 10 x 10 grids, meter sticks, number lines, money (coins), base 10 place value mats/charts
	▪ Identify the place values for each digit in decimals through thousandths. ▪ Read decimal numbers through thousandths from written words or place-value format. ▪ Write decimal numbers through thousandths from written words or from decimal numbers presented orally. ▪ Round decimal numbers to the nearest tenth or hundredth. ▪ Identify the symbols for the terms *greater than*, *less than*, and *equal to*. ▪ Compare the value of two decimal numbers through thousandths, using the symbols >, <, or =.	5.1		
	▪ Represent fractions (halves, fourths, fifths, eighths, and tenths) in their equivalent decimal forms. ▪ Represent decimals in their equivalent fraction forms (halves, fourths, fifths, eighths, and tenths). ▪ Determine equivalent relationships between decimals and fractions with denominators up to 12. ▪ Order from least to greatest a given set of no more than five numbers written as decimals and as fractions and mixed numbers with denominators of 12 or less.	5.2		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimal Operations & Estimation Addition and Subtraction	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: decimal squares, base 10 materials, 10 x 10 grids, meter sticks, number lines, money (coins), base 10 place value mats/charts
	▪ Determine an appropriate method of calculation to find the sum, difference, and product of two numbers expressed as decimals through thousandths, selecting from among paper and pencil, estimation, mental computation, and calculators. ▪ Estimate the sum, difference, and product of two numbers expressed as decimals through thousandths. ▪ Find the sum, difference, and product of two numbers expressed as decimals through thousandths, using paper and pencil. ▪ Find the sum, difference, and product of two numbers expressed as decimals through thousandths, using mental computation. ▪ Find the sum, difference, and product of two numbers expressed as decimals through thousandths, using calculators. ▪ Use estimation to check the reasonableness of a sum, difference, and product.	5.4		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimal Operations & Estimation: Multiplication and Division	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: decimal squares, base 10 materials, 10 x 10 grids, meter sticks, number lines, money (coins), base 10 place value mats/charts
	▪ Determine an appropriate method of calculation to find the product of two numbers expressed as decimals through thousandths, selecting from among paper and pencil, estimation, mental computation, and calculators. ▪ Estimate the product of two numbers expressed as decimals through thousandths. ▪ Find the product of two numbers expressed as decimals through thousandths, using paper and pencil. ▪ Find the product of two numbers expressed as decimals through thousandths, using mental computation. ▪ Find the product of two numbers expressed as decimals through thousandths, using calculators. ▪ Use estimation to check the reasonableness of the product.	5.4		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimal Operations & Estimation: Multiplication and Division (cont'd)	▪ Determine the quotient, given a dividend expressed as a decimal through thousandths (and no annexing of zeros during the division process) and a single-digit divisor. All dividends should be evenly divisible by the divisor.	5.6		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Fractions: Representations & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulative: fraction circles, pattern blocks, geo-boards, color tiles, graph paper, two-sided counters, chips, Cuisenaire rods, Unifix cubes, fraction strips
	▪ Represent fractions (halves, fourths, fifths, eighths, and tenths) in their equivalent decimal forms. ▪ Represent decimals in their equivalent fraction forms (halves, fourths, fifths, eighths, and tenths). ▪ Determine equivalent relationships between decimals and fractions with denominators up to 12. ▪ Order from least to greatest a given set of no more than five numbers written as decimals and as fractions and mixed numbers with denominators of 12 or less.	5.2		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Fraction Operations & Estimation: Addition and Subtraction	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: fraction circles, pattern blocks, geo-boards, color tiles, graph paper, two-sided counters, chips, Cuisenaire rods, Unifix cubes, fraction strips
	▪ Add and subtract fractions having like and unlike denominators. Denominators should be limited to 12 or less, and answers should be expressed in simplest form. ▪ Add and subtract with mixed numbers having like and unlike denominators, with and without regrouping. Denominators should be limited to 12 or less, and answers should be expressed in simplest form. ▪ Use estimation to check the reasonableness of a sum or difference.	5.7		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Length	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: rulers, yard sticks, meter sticks
	▪ Solve problems involving measurement by selecting an appropriate measuring device and a U.S. Customary or metric unit of measure for: - Length—part of an inch ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers.	5.11		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement Weight/Mass	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: balance scale, various weights
	▪ Solve problems involving measurement by selecting an appropriate measuring device and a U.S. Customary or metric unit of measure for: - Weight/mass—ounces, pounds, tons, grams, and kilograms.	5.11		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Volume (Liquid)	**The student will use problem solving, mathematical communication, mathematical reasoning, and connections to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: containers which measure cup, pint, gallon, quart, milliliter, or liter
	▪ Solve problems involving measurement by selecting an appropriate measuring device and a U.S. Customary or metric unit of measure for: - Liquid volume—cups pints, quarts, gallons, milliliters, and liters.	5.11		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Temperature	**The student will use problem solving, mathematical communication, mathematical reasoning, connecting and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: Celsius and Fahrenheit thermometers
	▪ Solve problems involving measurement by selecting an appropriate measuring device and a U.S. Customary or metric unit of measure for: - Temperature—Celsius and Fahrenheit units. ▪ Estimate the conversion of Celsius and Fahrenheit units relative to familiar situations: - Water freezes at 0°C and 32°F. - Water boils at 100°C and 212°F. - Normal body temperature is about 37°C and 98.6°F. - Room temperature is about 20°C and 70°F.	5.11		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Time	**The student will use problem solving, mathematical communication, mathematical reasoning, connecting and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: clocks
	▪ Determine elapsed time in hours and minutes within a 24-hour period.	5.12		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Perimeter, Area, Volume, Circumference	**The student will use problem solving, mathematical communication, mathematical reasoning, connecting and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: string, measuring tapes, rulers, tiles, toothpicks, cubes, geo-boards, compass, angle rulers ▪ DOE Geometry for Elementary Teachers Staff Development Guide
	▪ Determine the perimeter of a polygon, with or without diagrams, when - the lengths of all sides of a polygon that is not a rectangle or a square are given; - the length and width of a rectangle are given; or - the length of a side of a square is given. ▪ Determine the area of a square, with or without diagrams, when the length of a side is given. ▪ Determine the area of a rectangle, with or without diagrams, when the length and width are given. ▪ Determine the area of a right triangle, with or without diagrams, when the base and the height are given. ▪ Determine the perimeter of a polygon and area of a square, rectangle, and triangle, following the parameters listed above, using only whole number measurements given in metric or U.S. Customary units, and record the solution with the appropriate unit of measure (e.g., 24 square inches).	5.8		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Perimeter, Area, Volume, Circumference (cont'd)	▪ Describe the relationship between diameter and radius; and radius and circumference. ▪ Identify the diameter, radius, chord, and circumference of a given circle.	5.9		
	▪ Differentiate between the concepts of area, perimeter, and volume. ▪ Describe real-life situations where area, perimeter, and volume are appropriate measures to use, and justify their choices orally or in writing. ▪ Identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation	5.10		
	▪ Solve problems involving measurement by selecting an appropriate measuring device and a U.S. Customary or metric unit of measure for: ▪ Area—square units.	5.11		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Two-Dimensional (plane)	**The student will use problem solving, mathematical communication, mathematical reasoning, connecting and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: power polygons, tangrams, straightedge, ruler, angle ruler, protractor
	▪ Identify the appropriate tools (e.g., protractor and straightedge or angle ruler as well as available software) used to measure and draw angles and triangles. ▪ Draw right, acute, and obtuse angles, using appropriate tools. ▪ Measure right, acute, and obtuse angles, using appropriate tools, and identify their measures in degrees. ▪ Measure the angles of right, acute, and obtuse triangles, using appropriate tools, and identify their measures in degrees	5.13		
	▪ Classify angles as right, acute, and obtuse. ▪ Classify triangles as right, acute, and obtuse.	5.14		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Two-Dimensional (plane) (cont'd)	▪ Recognize and identify the properties of squares, rectangles, triangles, parallelograms, rhombi, kites and trapezoids. ▪ Describe the properties of squares, rectangles, triangles, parallelograms, rhombi, kites and trapezoids. ▪ Analyze the properties of squares, rectangles, triangles, parallelograms, rhombi, kites and trapezoids. ▪ Identify congruent, non-congruent, and similar figures. ▪ Describe the results of combining and subdividing shapes. ▪ Identify and describe a line of symmetry. ▪ Recognize the images of figures resulting from geometric transformations such as translation, reflection, or rotation	5.15a		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Three-Dimensional (solid)	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: solid geometric figures- cylinders, cone, cube, square pyramid, rectangular prism
	▪ Identify properties of three-dimensional (solid) geometric shapes (cylinder, cone, cube, square pyramid, and rectangular prism). ▪ Analyze and compare properties of three-dimensional (solid) geometric shapes (cylinder, cone, cube, square pyramid, and rectangular prism).	5.16		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Transformations	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: tracing paper, patty paper, mirrors, Miras, sets of paper and plastic triangles and quadrilaterals
	▪ Identify congruent, non-congruent, and similar figures. ▪ Describe the results of combining and subdividing shapes. ▪ Identify and describe a line of symmetry. ▪ Recognize the images of figures resulting from geometric transformations such as translation, reflection, or rotation	5.15b 5.15c 5.15d 5.15e		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Statistics	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: graph paper ▪ DOE Probability and Statistics for Elementary Teachers Staff Development Guide
	▪ Collect data, using observations (e.g., weather), measurement (e.g., shoe sizes), surveys (e.g., favorite television shows), or experiments (e.g., plant growth). ▪ Organize the data into a chart or table. ▪ Construct bar graphs, labeling one axis with equal whole-number or decimal increments and the other axis with attributes of the topic (categorical data) (e.g., skiing, basketball, ice hockey, skating, and sledding as the categories of "Favorite Winter Sports"). Bar graphs will have no more than six categories. ▪ Display data in line graphs, bar graphs, and stem-and-leaf plots.	5.18		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Statistics (cont'd)	▪ Construct line graphs, labeling the vertical axis with equal whole-number, decimal, or fractional increments and the horizontal axis with continuous data commonly related to time (e.g., hours, days, months, years, and age). Line graphs will have no more than six identified points along a continuum for continuous data (e.g., the decades: 1950s, 1960s, 1970s, 1980s, 1990s, and 2000s). ▪ Construct a stem-and-leaf plot to organize and display data, where the stem is listed in ascending order and the leaves are in ascending order, with or without commas between leaves. ▪ Title the given graph, or identify the title. ▪ Interpret the data to compare the answer to the prediction. ▪ Write a few sentences to describe the interpretation of the data.	5.18		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Statistics (cont'd)	▪ Write a few sentences to describe the analysis and interpretation of the data. ▪ Select from among four choices, a correct analysis of the data presented in a bar or line graph. For example, given a line graph showing the number of in-line skaters (in millions) in the U.S. over the time period 1980 – 2000 in five-year intervals, students should select the correct answer response that relates to the graph, such as, the greatest increase in number of in-line skaters occurred between 1990 – 1995. ▪ Explain the statistical concept of *mean.*	5.18		
	▪ Calculate the mean of a group of numbers representing data from a given context. ▪ Determine the median of a group of numbers representing data from a given context. ▪ Determine the mode of a group of numbers representing data from a given context. ▪ Determine the range of a group of numbers representing data from a given context.	5.19		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Probability	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: spinners, number cubes, two-color counters, coins, colored tiles ▪ DOE Probability and Statistics Staff Development Guide
	▪ Construct a sample space, using a tree diagram to identify all possible outcomes of a single event. ▪ Construct a sample space, using a list or chart to represent all possible outcomes of a single event. ▪ Determine the probability of a single event when the total number of possible outcomes is 12 or less. ▪ Determine the outcome of an event that is least likely to occur (0) or most likely to occur (1) when the number of possible outcomes is 12 or less. ▪ Create a problem statement involving probability based on information from a given problem situation. Students will not be expected to solve the problem	5.17		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Patterns and Functions: Representations & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: attribute blocks, pattern block, colored cubes and tiles, linking cubes, calculator ▪ DOE Patterns, Functions, and Algebra Staff Development Guide
	▪ Describe numerical and geometric patterns formed by using concrete materials and calculators. ▪ Express the relationship found in numerical and geometric patterns, using words, tables, graphs, or a mathematical sentence.	5.20		

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Algebra: Representations & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: algebra tiles, equation materials ▪ DOE Patterns, Functions, and Algebra Staff Development Guide
	▪ Describe the concept of a variable (presented as boxes, letters, or other symbols) as a representation of an unknown quantity. ▪ Use a variable expression to represent a given verbal expression involving one operation (e.g., "5 more than a number" can be represented by $x + 5$). ▪ Write an open sentence with addition, subtraction, multiplication, or division, using a variable to represent a missing number.	5.21		
	▪ Create and write a word problem to match a given open sentence with a single variable and one operation.	5.22		